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<110> Ni, Jian
Gentz, Reiner L.
Yu, Guo-liang
Rosen, Craig A.

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<141> 2000-05-04

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cctaccgcc atg gaa caa cgg gga cag aac gcc ccg gcc gct tcg ggg gcc 171

Met Glu Gln Arg Gly Pro Arg Gln Asn Ala Pro Ala Ala Ser Gly Ala
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cgg aaa agg cac ggc cca gga ccc agg gag gcg cgg gga gcc agg cct 219

Arg Lys Arg His Gly Pro Gly Pro Arg Glu Ala Arg Gly Ala Arg Pro
-35 -30 -25

ggg ccc cgg gtc ccc aag acc ctt gtg ctc gtt gtc gcc gcg gtc ctg 267

Gly Pro Arg Val Pro Lys Thr Leu Val Leu Val Val Ala Ala Val Leu
-20 -15 -10

ctg ttg gtc tca gct gag tct gct ctg atc acc caa caa gac cta gct	315
Leu Leu Val Ser Ala Glu Ser Ala Leu Ile Thr Gln Gln Asp Leu Ala	
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ccc cag cag aga gcg gcc cca caa caa aag agg tcc agc ccc tca gag	363
Pro Gln Gln Arg Ala Ala Pro Gln Gln Lys Arg Ser Ser Pro Ser Glu	
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gga ttg tgt cca cct gga cac cat atc tca gaa gac ggt aga gat tgc	411
Gly Leu Cys Pro Pro Gly His His Ile Ser Glu Asp Gly Arg Asp Cys	
30 35 40	
atc tcc tgc aaa tat gga cag gac tat agc act cac tgg aat gac ctc	459
Ile Ser Cys Lys Tyr Gly Gln Asp Tyr Ser Thr His Trp Asn Asp Leu	
45 50 55	
ctt ttc tgc ttg cgc tgc acc agg tgt gat tca ggt gaa gtg gag cta	507
Leu Phe Cys Leu Arg Cys Thr Arg Cys Asp Ser Gly Glu Val Glu Leu	
60 65 70 75	
agt ccc tgc acc acg acc aga aac aca gtg tgt cag tgc gaa gaa ggc	555
Ser Pro Cys Thr Thr Thr Arg Asn Thr Val Cys Gln Cys Glu Glu Gly	
80 85 90	
acc ttc cgg gaa gaa gat tct cct gag atg tgc cgg aag tgc cgc aca	603
Thr Phe Arg Glu Glu Asp Ser Pro Glu Met Cys Arg Lys Cys Arg Thr	
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Gly Cys Pro Arg Gly Met Val Lys Val Gly Asp Cys Thr Pro Trp Ser	
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gac atc gaa tgt gtc cac aaa gaa tca ggc atc atc ata gga gtc aca	699
Asp Ile Glu Cys Val His Lys Glu Ser Gly Ile Ile Ile Gly Val Thr	
125 130 135	
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Val Ala Ala Val Val Leu Ile Val Ala Val Phe Val Cys Lys Ser Leu	
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Leu Trp Lys Lys Val Leu Pro Tyr Leu Lys Gly Ile Cys Ser Gly Gly	
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ggt ggg gac cct gag cgt gtg gac aga agc tca caa cga cct ggg gct	843
Gly Gly Asp Pro Glu Arg Val Asp Arg Ser Ser Gln Arg Pro Gly Ala	
175 180 185	
gag gac aat gtc ctc aat gag atc gtg agt atc ttg cag ccc acc cag	891
Glu Asp Asn Val Leu Asn Glu Ile Val Ser Ile Leu Gln Pro Thr Gln	
190 195 200	
gtc cct gag cag gaa atg gaa gtc cag gag cca gca gag cca aca ggt	939
Val Pro Glu Gln Glu Met Glu Val Gln Glu Pro Ala Glu Pro Thr Gly	
205 210 215	
gtc aac atg ttg tcc ccc ggg gag tca gag cat ctg ctg gaa ccg gca	987
Val Asn Met Leu Ser Pro Gly Glu Ser Glu His Leu Leu Glu Pro Ala	
220 225 230 235	
gaa gct gaa agg tct cag agg agg agg ctg ctg gtt cca gca aat gaa	1035
Glu Ala Glu Arg Ser Gln Arg Arg Arg Leu Leu Val Pro Ala Asn Glu	
240 245 250	
ggt gat ccc act gag act ctg aga cag tgc ttc gat gac ttt gca gac	1083
Gly Asp Pro Thr Glu Thr Leu Arg Gln Cys Phe Asp Asp Phe Ala Asp	
255 260 265	
ttg gtg ccc ttt gac tcc tgg gag ccg ctc atg agg aag ttg ggc ctc	1131
Leu Val Pro Phe Asp Ser Trp Glu Pro Leu Met Arg Lys Leu Gly Leu	
270 275 280	

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Met Asp Asn Glu Ile Lys Val Ala Lys Ala Glu Ala Ala Gly His Arg
285 290 295

gac acc ttg tac acg atg ctg ata aag tgg gtc aac aaa acc ggg cga 1227
Asp Thr Leu Tyr Thr Met Leu Ile Lys Trp Val Asn Lys Thr Gly Arg
300 305 310 315

gat gcc tct gtc cac acc ctg ctg gat gcc ttg gag acg ctg gga gag 1275
Asp Ala Ser Val His Thr Leu Leu Asp Ala Leu Glu Thr Leu Gly Glu
320 325 330

aga ctt gcc aag cag aag att gag gac cac ttg ttg agc tct gga aag 1323
Arg Leu Ala Lys Gln Lys Ile Glu Asp His Leu Leu Ser Ser Gly Lys
335 340 345

ttc atg tat cta gaa ggt aat gca gac tct gcc atg tcc taagtgtgat 1372
Phe Met Tyr Leu Glu Gly Asn Ala Asp Ser Ala Met Ser
350 355 360

tctcttcagg aagtgaagacc ttccctgggt tacctttttt ctggaaaaag cccaactgga 1432

ctccagtcag taggaaagtg ccacaattgt cacatgaccg gtactggaag aaactctccc 1492

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-15 -10 -5

Val Ser Ala Glu Ser Ala Leu Ile Thr Gln Gln Asp Leu Ala Pro Gln
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Gln Arg Ala Ala Pro Gln Gln Lys Arg Ser Ser Pro Ser Glu Gly Leu
15 20 25

Cys Pro Pro Gly His His Ile Ser Glu Asp Gly Arg Asp Cys Ile Ser
30 35 40 45

Cys Lys Tyr Gly Gln Asp Tyr Ser Thr His Trp Asn Asp Leu Leu Phe
50 55 60

Cys Leu Arg Cys Thr Arg Cys Asp Ser Gly Glu Val Glu Leu Ser Pro
65 70 75

Cys Thr Thr Thr Arg Asn Thr Val Cys Gln Cys Glu Glu Gly Thr Phe
80 85 90

Arg Glu Glu Asp Ser Pro Glu Met Cys Arg Lys Cys Arg Thr Gly Cys
95 100 105

Pro Arg Gly Met Val Lys Val Gly Asp Cys Thr Pro Trp Ser Asp Ile
110 115 120 125

Glu Cys Val His Lys Glu Ser Gly Ile Ile Ile Gly Val Thr Val Ala
130 135 140

Ala Val Val Leu Ile Val Ala Val Phe Val Cys Lys Ser Leu Leu Trp
145 150 155

Lys Lys Val Leu Pro Tyr Leu Lys Gly Ile Cys Ser Gly Gly Gly Gly
 160 165 170
 Asp Pro Glu Arg Val Asp Arg Ser Ser Gln Arg Pro Gly Ala Glu Asp
 175 180 185
 Asn Val Leu Asn Glu Ile Val Ser Ile Leu Gln Pro Thr Gln Val Pro
 190 195 200 205
 Glu Gln Glu Met Glu Val Gln Glu Pro Ala Glu Pro Thr Gly Val Asn
 210 215 220
 Met Leu Ser Pro Gly Glu Ser Glu His Leu Leu Glu Pro Ala Glu Ala
 225 230 235
 Glu Arg Ser Gln Arg Arg Arg Leu Leu Val Pro Ala Asn Glu Gly Asp
 240 245 250
 Pro Thr Glu Thr Leu Arg Gln Cys Phe Asp Asp Phe Ala Asp Leu Val
 255 260 265
 Pro Phe Asp Ser Trp Glu Pro Leu Met Arg Lys Leu Gly Leu Met Asp
 270 275 280 285
 Asn Glu Ile Lys Val Ala Lys Ala Glu Ala Ala Gly His Arg Asp Thr
 290 295 300
 Leu Tyr Thr Met Leu Ile Lys Trp Val Asn Lys Thr Gly Arg Asp Ala
 305 310 315
 Ser Val His Thr Leu Leu Asp Ala Leu Glu Thr Leu Gly Glu Arg Leu
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 Ala Lys Gln Lys Ile Glu Asp His Leu Leu Ser Ser Gly Lys Phe Met
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 35 40 45
 Tyr Ile His Pro Gln Asn Asn Ser Ile Cys Cys Thr Lys Cys His Lys
 50 55 60
 Gly Thr Tyr Leu Tyr Asn Asp Cys Pro Gly Pro Gly Gln Asp Thr Asp
 65 70 75 80
 Cys Arg Glu Cys Glu Ser Gly Ser Phe Thr Ala Ser Glu Asn His Leu
 85 90 95
 Arg His Cys Leu Ser Cys Ser Lys Cys Arg Lys Glu Met Gly Gln Val
 100 105 110
 Glu Ile Ser Ser Cys Thr Val Asp Arg Asp Thr Val Cys Gly Cys Arg
 115 120 125
 Lys Asn Gln Tyr Arg His Tyr Trp Ser Glu Asn Leu Phe Gln Cys Phe
 130 135 140

Asn Cys Ser Leu Cys Leu Asn Gly Thr Val His Leu Ser Cys Gln Glu
 145 150 155 160
 Lys Gln Asn Thr Val Cys Thr Cys His Ala Gly Phe Phe Leu Arg Glu
 165 170 175
 Asn Glu Cys Val Ser Cys Ser Asn Cys Lys Lys Ser Leu Glu Cys Thr
 180 185 190
 Lys Leu Cys Leu Pro Gln Ile Glu Asn Val Lys Gly Thr Glu Asp Ser
 195 200 205
 Gly Thr Thr Val Leu Leu Pro Leu Val Ile Phe Phe Gly Leu Cys Leu
 210 215 220
 Leu Ser Leu Leu Phe Ile Gly Leu Met Tyr Arg Tyr Gln Arg Trp Lys
 225 230 235 240
 Ser Lys Leu Tyr Ser Ile Val Cys Gly Lys Ser Thr Pro Glu Lys Glu
 245 250 255
 Gly Glu Leu Glu Gly Thr Thr Thr Lys Pro Leu Ala Pro Asn Pro Ser
 260 265 270
 Phe Ser Pro Thr Pro Gly Phe Thr Pro Thr Leu Gly Phe Ser Pro Val
 275 280 285
 Pro Ser Ser Thr Phe Thr Ser Ser Ser Thr Tyr Thr Pro Gly Asp Cys
 290 295 300
 Pro Asn Phe Ala Ala Pro Arg Arg Glu Val Ala Pro Pro Tyr Gln Gly
 305 310 315 320
 Ala Asp Pro Ile Leu Ala Thr Ala Leu Ala Ser Asp Pro Ile Pro Asn
 325 330 335
 Pro Leu Gln Lys Trp Glu Asp Ser Ala His Lys Pro Gln Ser Leu Asp
 340 345 350
 Thr Asp Asp Pro Ala Thr Leu Tyr Ala Val Val Glu Asn Val Pro Pro
 355 360 365
 Leu Arg Trp Lys Glu Phe Val Arg Arg Leu Gly Leu Ser Asp His Glu
 370 375 380
 Ile Asp Arg Leu Glu Leu Gln Asn Gly Arg Cys Leu Arg Glu Ala Gln
 385 390 395 400
 Tyr Ser Met Leu Ala Thr Trp Arg Arg Arg Thr Pro Arg Arg Glu Ala
 405 410 415
 Thr Leu Glu Leu Leu Gly Arg Val Leu Arg Asp Met Asp Leu Leu Gly
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Lys Gly Leu Glu Leu Arg Lys Thr Val Thr Thr Val Glu Thr Gln Asn
 35 40 45
 Leu Glu Gly Leu His His Asp Gly Gln Phe Cys His Lys Pro Cys Pro
 50 55 60
 Pro Gly Glu Arg Lys Ala Arg Asp Cys Thr Val Asn Gly Asp Glu Pro
 65 70 75 80
 Asp Cys Val Pro Cys Gln Glu Gly Lys Glu Tyr Thr Asp Lys Ala His
 85 90 95
 Phe Ser Ser Lys Cys Arg Arg Cys Arg Leu Cys Asp Glu Gly His Gly
 100 105 110
 Leu Glu Val Glu Ile Asn Cys Thr Arg Thr Gln Asn Thr Lys Cys Arg
 115 120 125
 Cys Lys Pro Asn Phe Phe Cys Asn Ser Thr Val Cys Glu His Cys Asp
 130 135 140
 Pro Cys Thr Lys Cys Glu His Gly Ile Ile Lys Glu Cys Thr Leu Thr
 145 150 155 160
 Ser Asn Thr Lys Cys Lys Glu Glu Gly Ser Arg Ser Asn Leu Gly Trp
 165 170 175
 Leu Cys Leu Leu Leu Leu Pro Ile Pro Leu Ile Val Trp Val Lys Arg
 180 185 190
 Lys Glu Val Gln Lys Thr Cys Arg Lys His Arg Lys Glu Asn Gln Gly
 195 200 205
 Ser His Glu Ser Pro Thr Leu Asn Pro Glu Thr Val Ala Ile Asn Leu
 210 215 220
 Ser Asp Val Asp Leu Ser Lys Tyr Ile Thr Thr Ile Ala Gly Val Met
 225 230 235 240
 Thr Leu Ser Gln Val Lys Gly Phe Val Arg Lys Asn Gly Val Asn Glu
 245 250 255
 Ala Lys Ile Asp Glu Ile Lys Asn Asp Asn Val Gln Asp Thr Ala Glu
 260 265 270
 Gln Lys Val Gln Leu Leu Arg Asn Trp His Gln Leu His Gly Lys Lys
 275 280 285
 Glu Ala Tyr Asp Thr Leu Ile Lys Asp Leu Lys Lys Ala Asn Leu Cys
 290 295 300
 Thr Leu Ala Glu Lys Ile Gln Thr Ile Ile Leu Lys Asp Ile Thr Ser
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 35 40 45

Arg Gly Cys Pro Ala Gly His Tyr Leu Lys Ala Pro Cys Thr Glu Pro
 50 55 60
 Cys Gly Asn Ser Thr Cys Leu Val Cys Pro Gln Asp Thr Phe Leu Ala
 65 70 75 80
 Trp Glu Asn His His Asn Ser Glu Cys Ala Arg Cys Gln Ala Cys Asp
 85 90 95
 Glu Gln Ala Ser Gln Val Ala Leu Glu Asn Cys Ser Ala Val Ala Asp
 100 105 110
 Thr Arg Cys Gly Cys Lys Pro Gly Trp Phe Val Glu Cys Gln Val Ser
 115 120 125
 Gln Cys Val Ser Ser Ser Pro Phe Tyr Cys Gln Pro Cys Leu Asp Cys
 130 135 140
 Gly Ala Leu His Arg His Thr Arg Leu Leu Cys Ser Arg Arg Asp Thr
 145 150 155 160
 Asp Cys Gly Thr Cys Leu Pro Gly Phe Tyr Glu His Gly Asp Gly Cys
 165 170 175
 Val Ser Cys Pro Thr Ser Thr Leu Gly Ser Cys Pro Glu Arg Cys Ala
 180 185 190
 Ala Val Cys Gly Trp Arg Gln Met Phe Trp Val Gln Val Leu Leu Ala
 195 200 205
 Gly Leu Val Val Pro Leu Leu Leu Gly Ala Thr Leu Thr Tyr Thr Tyr
 210 215 220
 Arg His Cys Trp Pro His Lys Pro Leu Val Thr Ala Asp Glu Ala Gly
 225 230 235 240
 Met Glu Ala Leu Thr Pro Pro Pro Ala Thr His Leu Ser Pro Leu Asp
 245 250 255
 Ser Ala His Thr Leu Leu Ala Pro Pro Asp Ser Ser Glu Lys Ile Cys
 260 265 270
 Thr Val Gln Leu Val Gly Asn Ser Trp Thr Pro Gly Tyr Pro Glu Thr
 275 280 285
 Gln Glu Ala Leu Cys Pro Gln Val Thr Trp Ser Trp Asp Gln Leu Pro
 290 295 300
 Ser Arg Ala Leu Gly Pro Ala Ala Ala Pro Thr Leu Ser Pro Glu Ser
 305 310 315 320
 Pro Ala Gly Ser Pro Ala Met Met Leu Gln Pro Gly Pro Gln Leu Tyr
 325 330 335
 Asp Val Met Asp Ala Val Pro Ala Arg Arg Trp Lys Glu Phe Val Arg
 340 345 350
 Thr Leu Gly Leu Arg Glu Ala Glu Ile Glu Ala Val Glu Val Glu Ile
 355 360 365
 Gly Arg Phe Arg Asp Gln Gln Tyr Glu Met Leu Lys Arg Trp Arg Gln
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cggaatgata cagacatttc cataggtcct tattatcaca ttcagcttat aaaataatgc 180
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<223> Description of Artificial Sequence: Primer

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<210> 12
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tctcccggac tcctgaggtc acatgcgtgg tgggtggacgt aagccacgaa gaccctgagg 180
tcaagttcaa ctggtacgtg gacggcgtgg aggtgcataa tgccaagaca aagccgcggg 240
aggagcagta caacagcacg taccgtgtgg tcagcgtcct caccgtcctg caccaggact 300
ggctgaatgg caaggagtac aagtgaagg tctccaacaa agcctccca acccccatcg 360
agaaaaccat ctccaaagcc aaagggcagc cccgagaacc acaggtgtac accctgcccc 420
catcccggga tgagctgacc aagaaccagg tcagcctgac ctgcctggtc aaaggcttct 480
atccaagcga catcgccgtg gagtgggaga gcaatgggca gccggagaac aactacaaga 540
ccacgcctcc cgtgctggac tccgacggct ccttcttctt ctacagcaag ctacaccgtg 600
acaagagcag gtggcagcag gggaacgtct tctcatgtct cgtgatgcat gaggctctgc 660
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gactctagag gat 733

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aggngcgggg agccaggcct gggccccggg tccccaaagac ctttgtgtct gttgtcgccg 180
cggtcctgct gttggtgagt ccccgccgcg gtccttggtt ggggaagagc gtnctggcg 240
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